"The city of Montreal, which has a population of about 150,000 souls, has twice entertained the American association for the advancement of science, — for the second time, in August, 1882, when an attendance of more than nine hundred members and associates was registered, — and the association, with its nine sections, found ample accommodation in the buildings of McGill university. . . . We have assurance that the government of the Dominion of Canada will make a liberal grant of money to defray the expenses of members of the British association in crossing the ocean, and that the various railroad and steamboat lines in Canada and in the United States will offer most liberal arrangements to our guests. The Grand Trunk railway will arrange for an excursion of members of the association to the Great Lakes and Chicago; while the Canadian Pacific railroad will give an excursion to the provinces of the north-west, as far as the Rocky Mountains. The city of Montreal, from its climate, its geographical position, and its ways of communication, offers many attractions alike to the traveller and the student. The large and important collections of the geological survey of Canada, gathered during the past forty years, are in the museum at Ottawa; and these, together with extensive collections contained in the museum of the Natural history society of Montreal, and in that of McGill university, furnish ample materials for the study of the natural history of Canada. . . .

"Members of the British association, in coming to Canada, may be assured of a most cordial welcome and generous hospitality, not only from the citizens of Montreal, where every facility will be furnished for their meeting, but from the people throughout the country. It is hoped by the invitation committee that these assurances, and the above statement of the advantages and facilities offered them, may secure a large attendance of the members of the British association at Montreal in 1884."

It is well known that considerable opposition has existed in England to the project of meeting in Montreal; and it is natural that many of the life-members and associates who cannot visit Canada should view it with disfavor: but it is believed that the leading members of the association are of a different opinion, and that the hearty action of the city of Montreal and the dominion government will do much to disarm such opposition as may manifest itself next summer at Southport, where the final decision must be made.

It is to be observed, that in the present year the meeting of the American association, at Minneapolis, is early (Aug. 17); while that of the British association, at Southport, which is, besides, in the immediate vicinity of Liverpool, is unusually late (Sept. 19). This will allow members of the American association to attend both meetings; and it is stated that the retiring president of the American association, and possibly others of its members, may avail themselves of this privilege. This may possibly permit arrangements to be made which might substantially unite the meetings of the two associations in 1884, and so prepare for an international meeting in the future. If the meeting of the American association for 1884 can be fixed for some north-eastern city, sufficiently near to Montreal, and can be timed so as to occur a week before or after that of the British association, there can be no doubt that a great number of the members of the latter body would take advantage of the opportunity to enjoy the companionship of their American *confrères;* while, on the other hand, many of these would gladly spend a few days at the meeting of the British association. In this way it would seem that a greater benefit to science might result than even from an international meeting. There would be time for the complete transaction of the business of both associations. Neither would suffer, either pecuniarily or in the value of its proceedings; and there would be the best possible opportunity for interchange of ideas between the scientific men of the United States, Great Britain, and Canada. Nor is it unlikely that some scientific workers from the continent of Europe and elsewhere may be attracted by a combination so unusual. It may thus be hoped that the proposed meeting of the British association in Canada may not only be one of the most successful that this mother of associations has held, but may inaugurate an epoch of renewed activity and progress in the widely-spread scientific work of the two great associations of the English-speaking race.

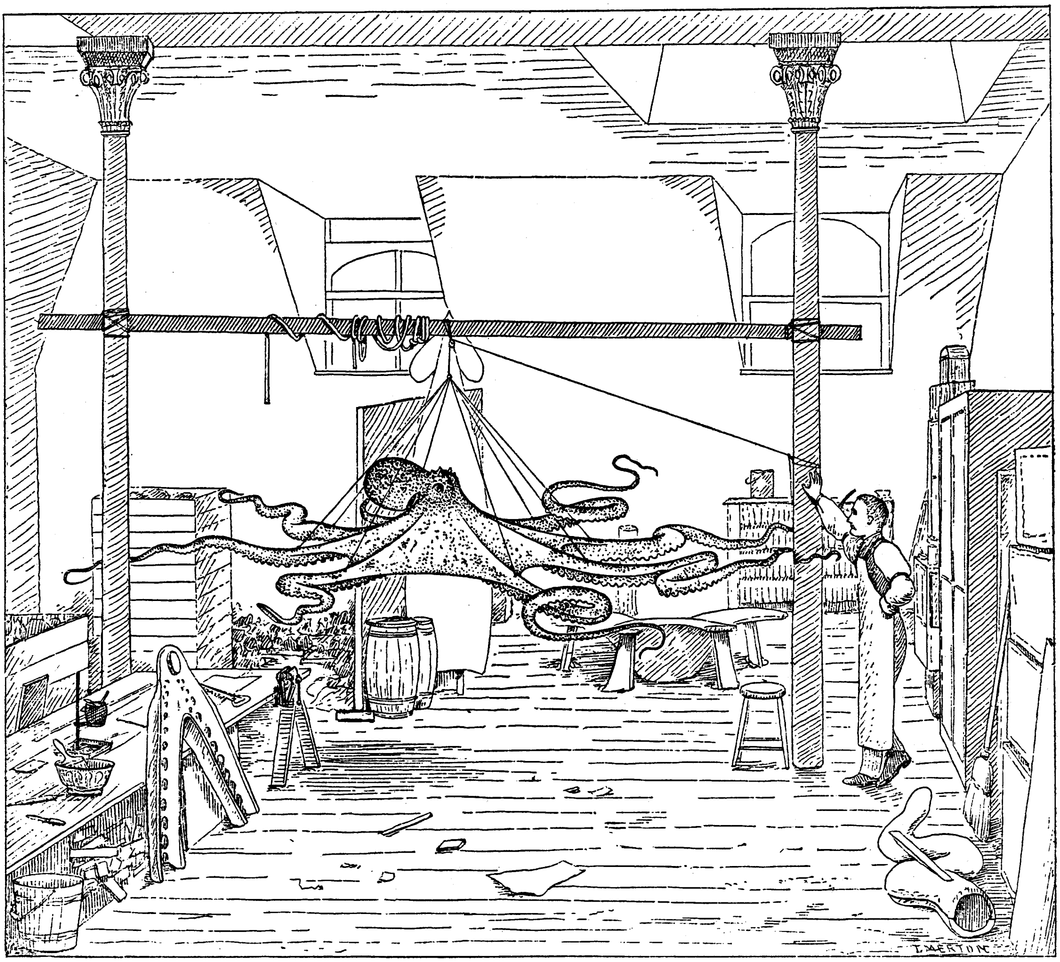
MODEL OF THE GIANT OCTOPUS OF THE WEST COAST OF AMERICA.

WHILE working on the models of the large Newfoundland squid (Architeuthis princeps) for the Yale and Harvard museums, it was proposed that I should also model the large Octopus of the west coast of America. Nothing was done upon it, however, until the past winter, while preparations were making by the U. S. fish-commission for the International fishery exhibition in London. For this exhibition, Mr. William Palmer, one of the modellers of the National museum in Washington,

was sent to New Haven to make a copy of the Architeuthis model; and, while this was in progress, plans for the Octopus were often discussed, and finally arrangements were made for him to remain in New Haven, to assist in making an Octopus model and a paper cast for the fishery exhibition.

As neither of us had seen the animal alive, nor could make a trip to California for the purpose, the model had to be copied chiefly from specimens preserved in alcohol, and restored according to the best information we could get as to its appearance when living. The largest specimens we could get were badly shrunken by the alcohol; and one of moderate size, with arms about three feet long, was selected; and from this most of the details of the model were enlarged four times.

The original description of Octopus punctatus by Gabb, in the proceedings of the California academy of sciences for 1862, is from a small specimen preserved in alcohol, and so was of little use; and there appears to have been no good description published since, though there have been numerous notices of the capture of specimens of large size.



MODEL OF THE GIANT OCTOPUS HANGING IN THE WORKSHOP OF THE YALE MUSEUM.

On all anatomical points we depended chiefly on Professor Verrill's knowledge of the cephalopods. In the color, size, and position of the body, we were aided by descriptions and sketches by Messrs. W. H. Dall and A. Agassiz, who had seen it alive. I was also guided by my knowledge of Octopus Bairdii, the small species of the east coast, which I had several times seen alive.

The position of the middle part of the body

is that often taken by Octopus Bairdii when resting on the bottom after swimming, with the head raised, and the body supported on the thickest part of the arms. The ends of the arms are curved irregularly, as they might be in an animal just starting to crawl.

The highest point of the body is twenty-two inches above the lowest suckers. The arms spread over a circle eighteen feet in diameter, and the connecting membrane between the lateral arms extends three feet from the mouth. The longest arms, those of the second pair, are made as long as the largest measurements from life (sixteen feet) ; and the shortest, the fourth pair, thirteen feet. The third arm on the right side is shorter than the others, and hectocotylized in the male, and is so made in the model. All the arms are four inches in diameter at the thickest part. The body is made proportionally smaller than in small specimens. The warts on the head are copied from one of the largest specimens examined, the others showing only two pairs over the eyes. The membranes between the arms have been made much as they are in alcohol, but somewhat wider and more distinct along the sides of the arms. The largest suckers are two and a quarter inches in diameter, and decrease in size from the thickest part of the arm toward the tip, and toward the mouth.

For convenience in making and moving the model, the arms are made removable at a distance of three feet from the mouth, just beyond the edge of the widest membrane.

The upper side of the middle part of the model, including the head and body, was modelled in clay, and a mould made from it in plaster. This was then turned over, and the mouth and under sides of the bases of the arms modelled in it. The arms are so much alike that it was only necessary to model the bases of two of them, — one right and one left; and from these a plaster mould was taken in which the casts of the bases of all the arms were made. This mould stands against the table at the left in the engraving. The ends of the arms were modelled in a similar way, the back being first finished, and a plaster mould made, which was turned over, and the under side modelled upon it. For modelling the tops of the suckers, a set of stamps was made. A set of suckers of the desired sizes was modelled in clay on a turntable, and plaster casts made of the tops of them, and these used to stamp the tops of the rest of the suckers, which were trimmed round with a knife, and attached to the arm with soft clay, after which, the narrow membranes connecting the larger suckers were modelled between them.

When the moulds were dry, the paper casts were made in them by methods which had been used by Mr. Palmer for models of large fishes and cetacea. The moulds having been greased, paper soaked with paste was laid in it, and pressed and rubbed with the hands until it fitted close to the surface of the mould, and the edges of the pieces of paper adhered together. When the first layer of paper was nearly dry, another was pasted over it; and, if the strength of the model required it, other layers were added. The thin membranes between the arms were strengthened by wire netting between the two layers of paper, the meshes being filled with whiting mixed with glue. On the surfaces of the suckers, paper pulp was put in the mould before the paper was pasted in.

After drying several days, the casts were taken from the moulds, the edges trimmed, and the pieces fastened together with glue. The broken places in the casts were mended with paper pulp, the joints covered over with the same material, and, when dry, the surface was smoothed with sandpaper, and varnished with shellac. The siphon was made separately, and afterward attached to the body. The mouth was made of plaster, showing the jaws closed. The eyes are of glass, like ordinary birds'-eyes, painted and silvered according to the best evidence we could get as to their color.

The color of Octopus punctatus seems to differ greatly, according to its moods and surroundings. It is commonly described as light orange or yellow with reddish-brown spots. At other times it appears to be bright orange and crimson, with dark-brown blotches on the back. The model was first painted light gray, on which the other colors were thrown from a brush in fine spots. The orange spots are scattered over the whole surface, and more thickly in patches along the back and sides of the arms. Crimson spots are distributed in the same way; and over both, dark-brown spots are thinly scattered. The faces of the suckers are yellowish white without spots.

The model weighs about seventy pounds, and is stiff and strong enough for ordinary handling, and only liable to be broken by a fall or sudden blow. It is intended to be hung in a horizontal position, as in the engraving, but high enough for the under side to be seen, as well as the upper. It hangs by eight wires attached to rings near the joints in the arms, and connected together above so that it can be hung from a single hook.

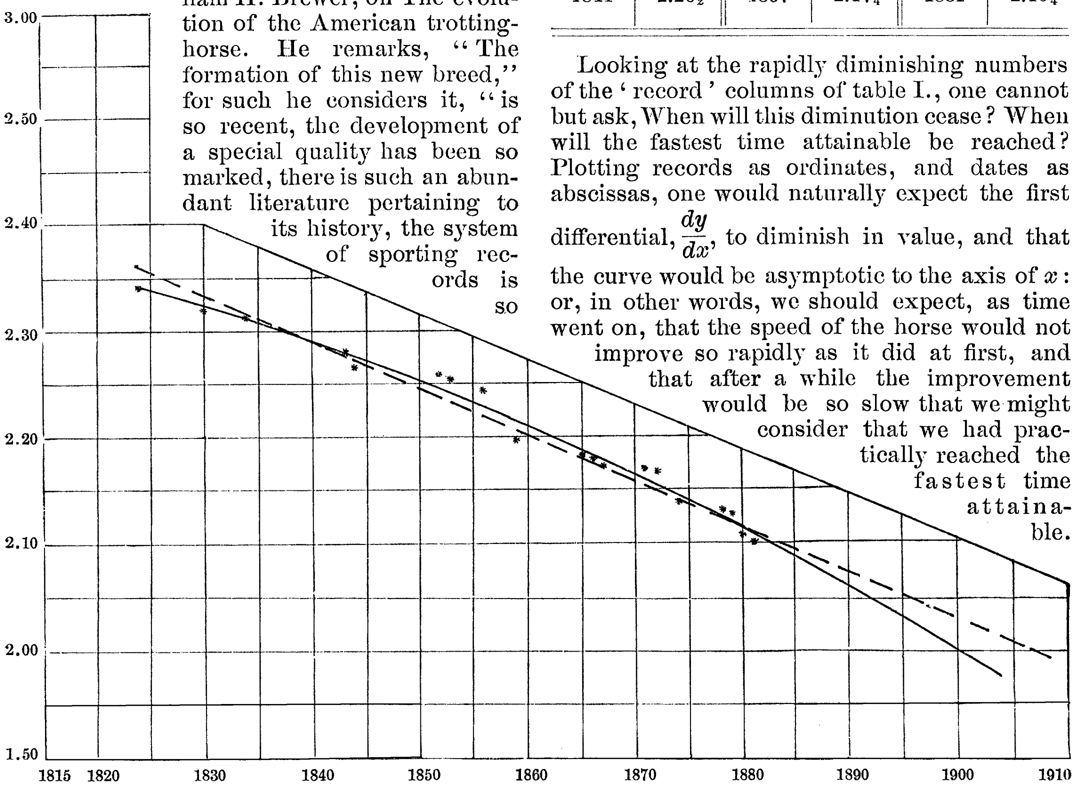
The engraving shows the model hanging in

the workshop at the Yale museum. The pillars between which it hangs are fourteen feet high. On the floor, in the back part of the room, is the mould of the body, and bases of the arms. At the left, against the table, is the mould for the under sides of the bases of the arms, and at the right, on the floor, one of the arm-moulds, with the two parts fitted together.

J. H. EMERTON.

HORSE-TROTTING FROM A MATHEMATICAL STAND-POINT.

IN the April number of the *American journal of science* is a very interesting article by William H. Brewer, on The evolution of the American trotting-horse. He remarks, "The formation of this new breed," for such he considers it, "is so recent, the development of a special quality has been so marked, there is such an abundant literature pertaining to its history, the system of sporting records is so carefully planned and comprehensively conducted, and withal has become so extensive, that we have the data for a reasonably accurate determination of the influences at work which led to this new breed being made, the materials of which it is made, and the rate of progress of the special evolution." Towards the end of the paper are given some tables, which are copied in part beyond. The writer concludes by hoping that some one will plot the curves which naturally suggest themselves, and determine "how fast horses will ultimately trot, and when this maximum will be reached."



ABSCISSAS REPRESENT DATES; ORDINATES, THE BEST RECORD OF MILE HEATS.

I.—Best record of mile heats up to the present time.

Date.	Record.	Date.	Record.	Date.	Record.
1818	3.00	1852	2.26	1871	2.17
1824	2.40	1853	2.25½	1872	2.16¾
"	2.34	1856	2.24½	1874	2.14
1830	2.32	1859	2.19¾	1878	2.13¼
1834	2.31½	1865	2.18¼	1879	2.12¾
1843	2.28	1866	2.18	1880	2.10¾
1844	2.26½	1867	2.17¼	1881	2.10¼

Looking at the rapidly diminishing numbers of the 'record' columns of table I., one cannot but ask, When will this diminution cease? When will the fastest time attainable be reached? Plotting records as ordinates, and dates as abscissas, one would naturally expect the first differential, $\frac{dy}{dx}$, to diminish in value, and that the curve would be asymptotic to the axis of x: or, in other words, we should expect, as time went on, that the speed of the horse would not improve so rapidly as it did at first, and that after a while the improvement would be so slow that we might consider that we had practically reached the fastest time attainable. But we find, with the exception of the first, that all the points lie very nearly on a curve which is convex upwards: in other words, that the rate of improvement of the record is increasing instead of diminishing, and that it will cross the two-minute line about the year 1901.

It is very evident that this state of things cannot go on indefinitely: otherwise we should in course of time have a horse trot a mile in no